FIG. 1

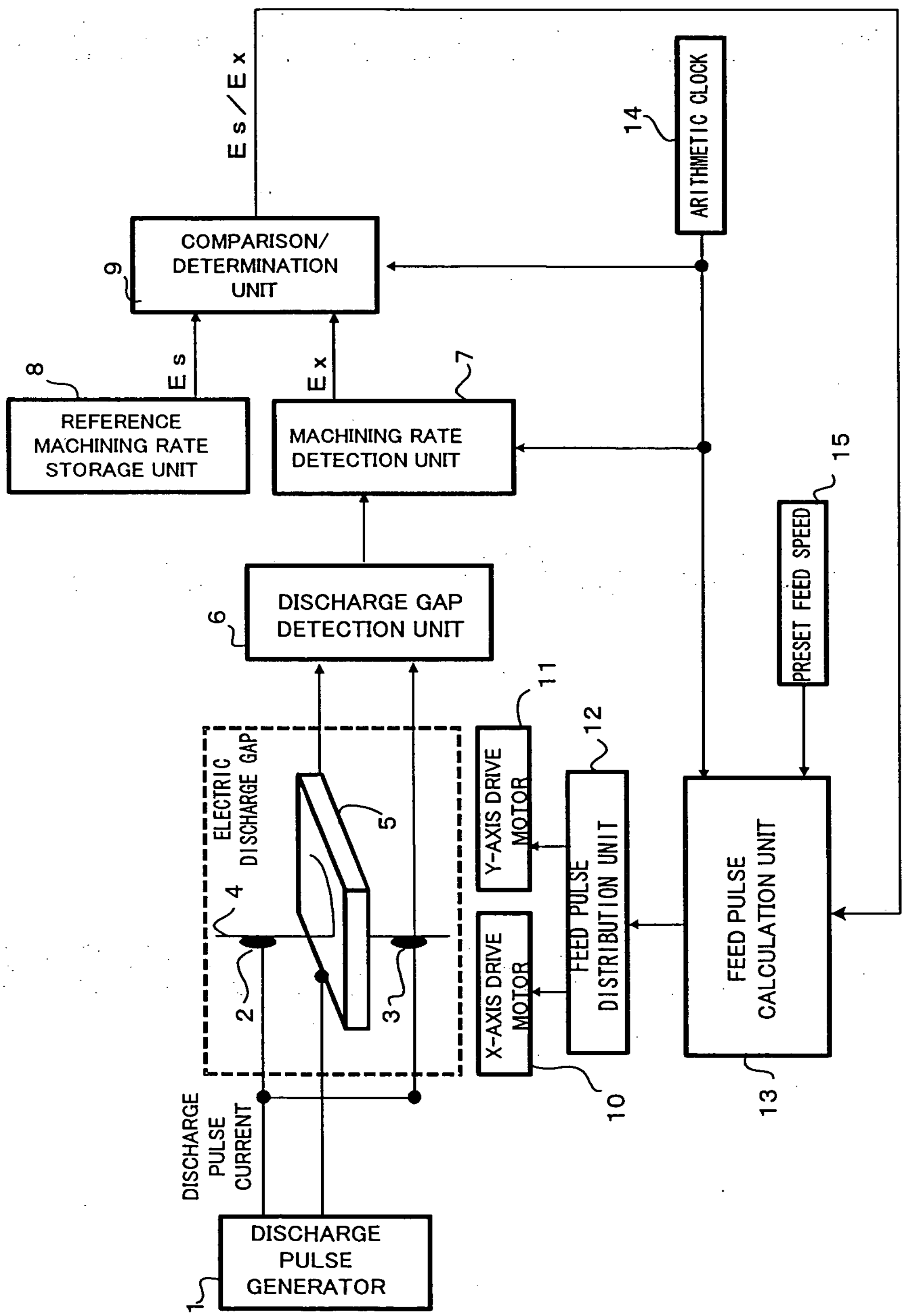
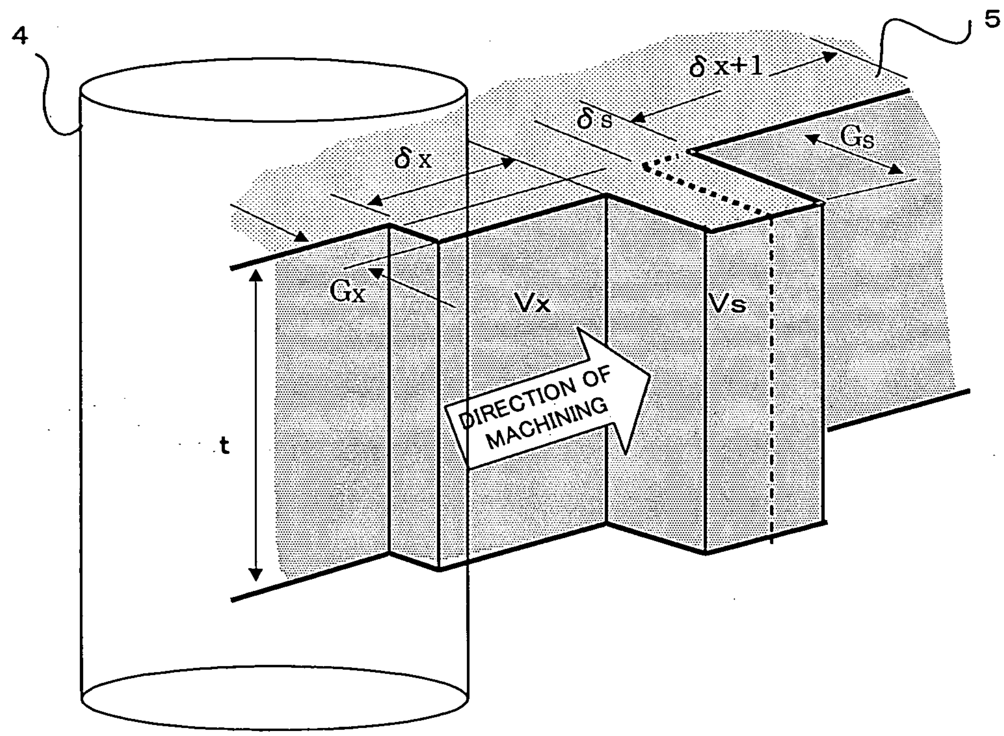

DISCHARGE PULSE GENERATOR
1
DISCHARGE PULSE CURRENT
ELECTRIC DISCHARGE GAP
2
3
4
5
DISCHARGE GAP DETECTION UNIT
6
MACHINING RATE DETECTION UNIT
7
REFERENCE MACHINING RATE STORAGE UNIT
8
Es
Ex
COMPARISON/ DETERMINATION UNIT
9
Es/Ex
X-AXIS DRIVE MOTOR
10
Y-AXIS DRIVE MOTOR
11
FEED PULSE DISTRIBUTION UNIT
12
FEED PULSE CALCULATION UNIT
13
ARITHMETIC CLOCK
14
PRESET FEED SPEED
15

FIG. 2



Gs , Gx : WIDTH OF PORTION TO BE REMOVED

Vx , Vs : AVERAGE MACHINING VOLTAGE

Vo : NO LOAD VOLTAGE

Vs < Vx IN THIS CASE

δs : REFERENCE MOTION AMOUNT PER UNIT TIME

δx : MOTION AMOUNT PER UNIT TIME

$= \delta s * (Vo - Vs) / (Vo - Vx)$

t : THICKNESS

S: AREA OF ELECTRIC DISCHARGE ∝ G × t

FIG. 3

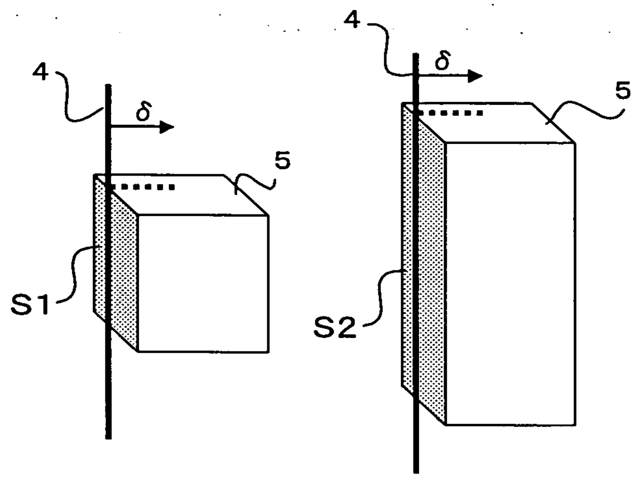


FIG. 4

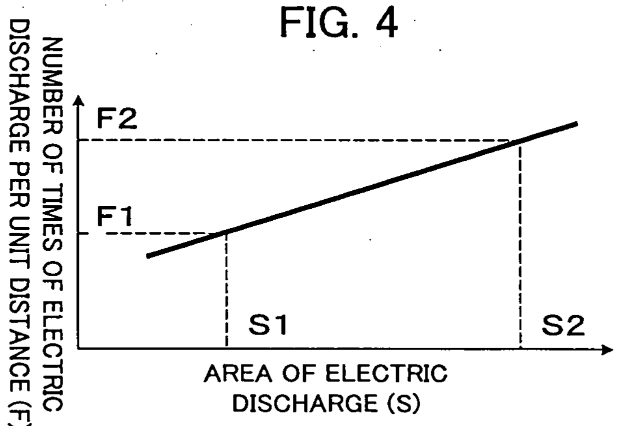


FIG. 5

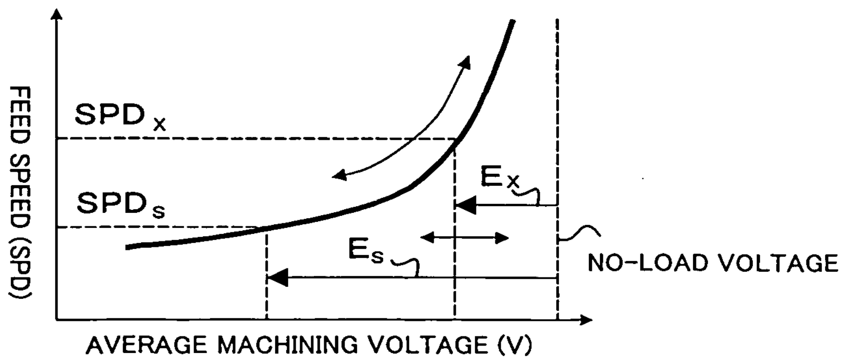


FIG. 6

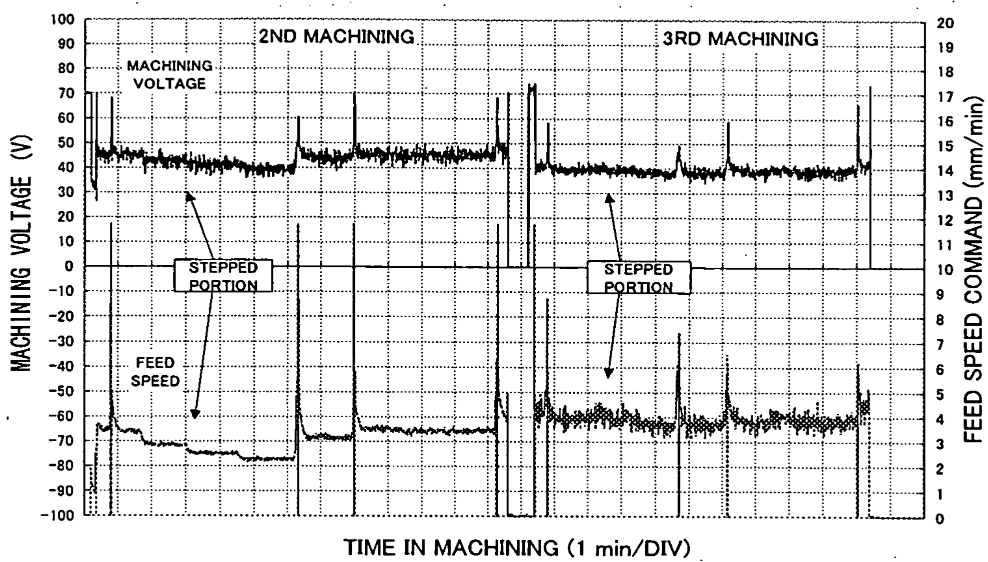

100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
MACHINING VOLTAGE (V)
2ND MACHINING
3RD MACHINING
MACHINING VOLTAGE
STEPPED PORTION
STEPPED PORTION
FEED SPEED
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
FEED SPEED COMMAND (mm/min)
TIME IN MACHINING (1 min/DIV)

FIG. 7

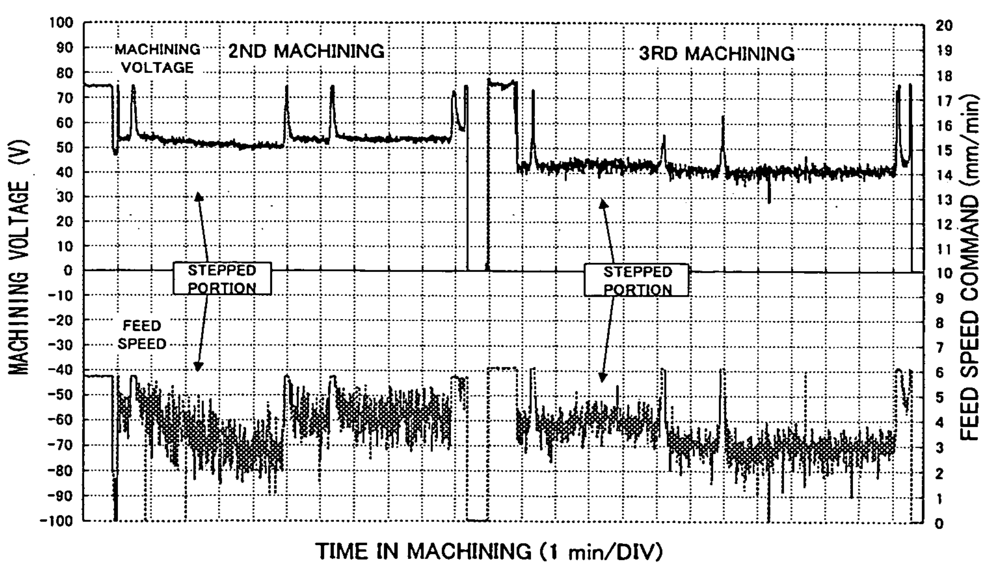

100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
MACHINING VOLTAGE (V)
MACHINING VOLTAGE
2ND MACHINING
3RD MACHINING
STEPPED PORTION
STEPPED PORTION
FEED SPEED
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
FEED SPEED COMMAND (mm/min)
TIME IN MACHINING (1 min/DIV)

FIG. 8

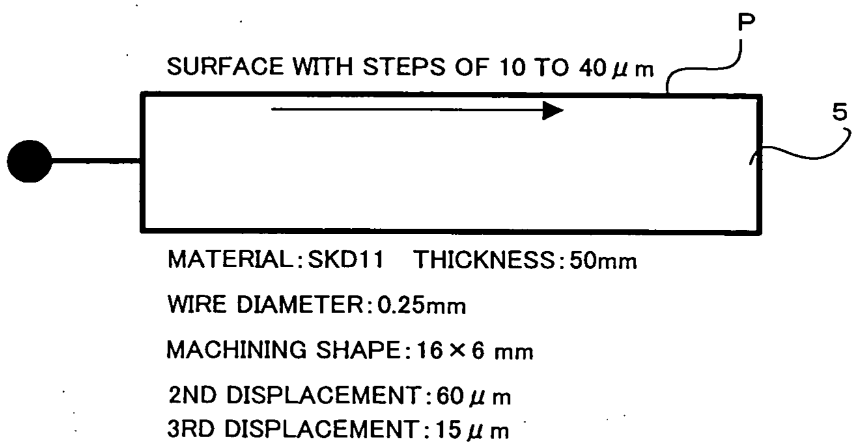

SURFACE WITH STEPS OF 10 TO 40 μm
P
5
MATERIAL: SKD11   THICKNESS: 50mm
WIRE DIAMETER: 0.25mm
MACHINING SHAPE: 16 × 6 mm
2ND DISPLACEMENT: 60 μm
3RD DISPLACEMENT: 15 μm

FIG. 9

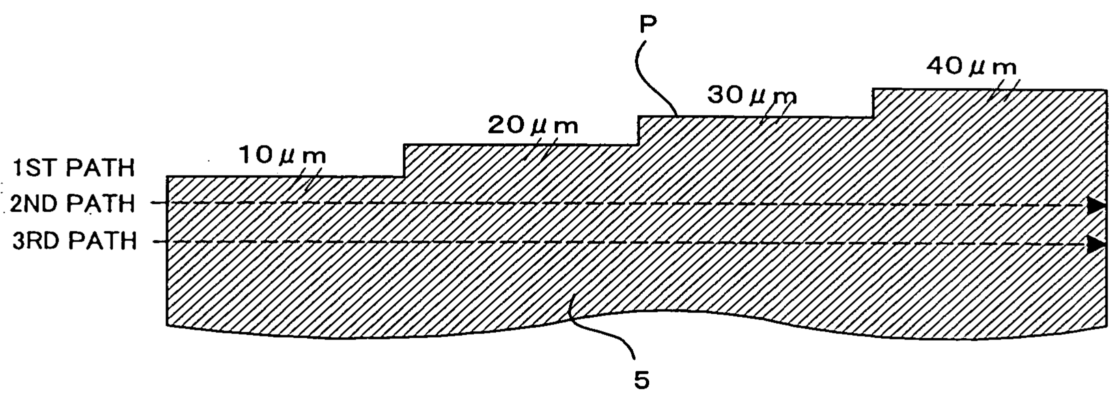

P
40 μm
30 μm
20 μm
10 μm
1ST PATH
2ND PATH
3RD PATH
5

FIG.10

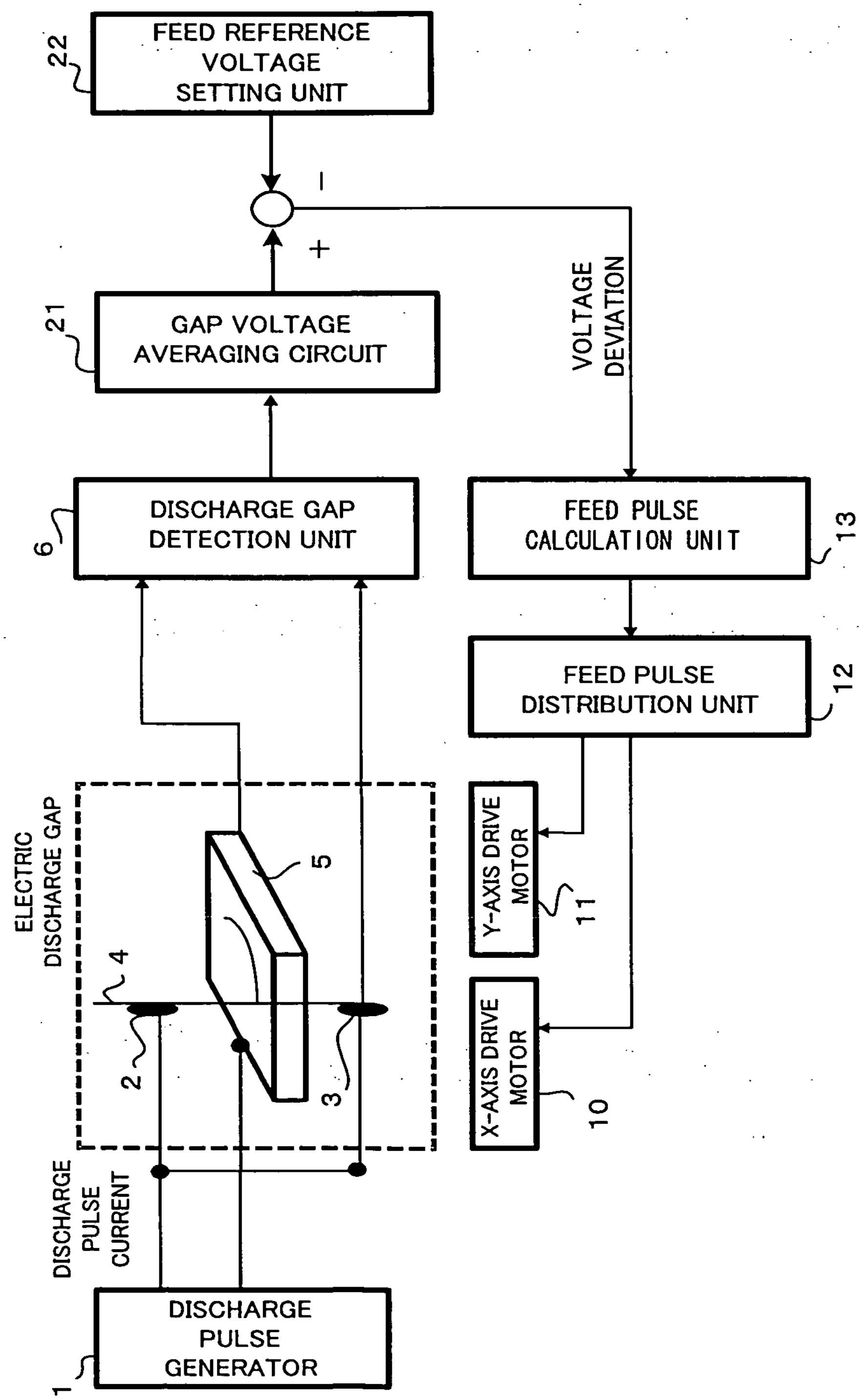
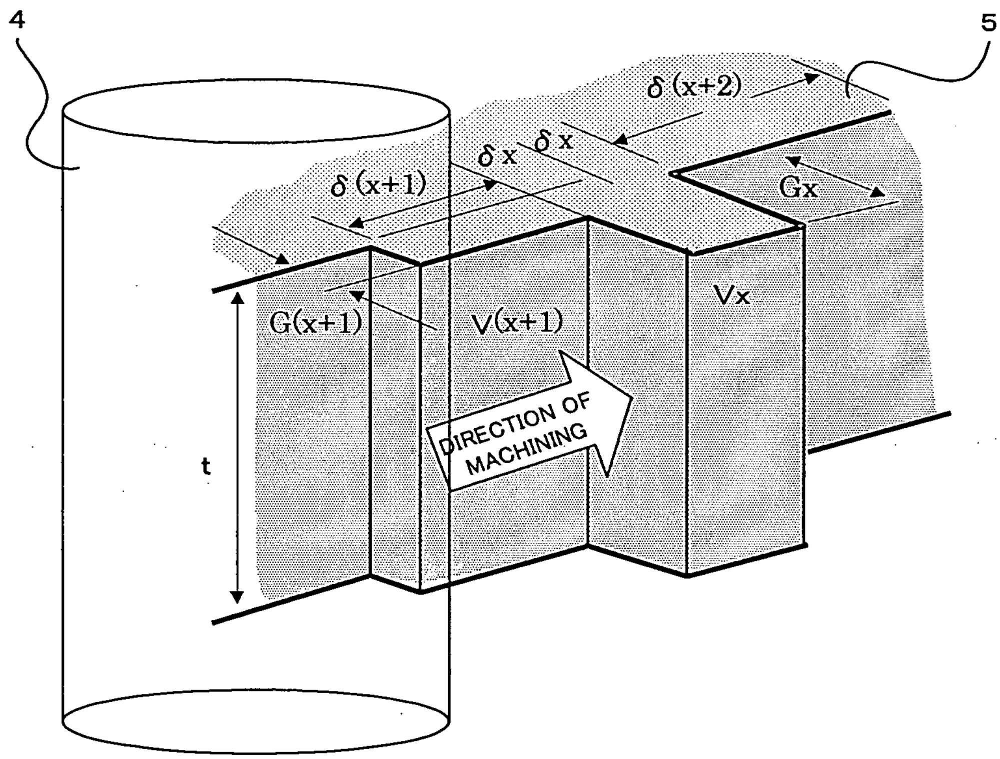

FEED REFERENCE VOLTAGE SETTING UNIT
22
−
+
GAP VOLTAGE AVERAGING CIRCUIT
21
VOLTAGE DEVIATION
DISCHARGE GAP DETECTION UNIT
6
FEED PULSE CALCULATION UNIT
13
FEED PULSE DISTRIBUTION UNIT
12
ELECTRIC DISCHARGE GAP
4
5
2
3
Y-AXIS DRIVE MOTOR
11
X-AXIS DRIVE MOTOR
10
DISCHARGE PULSE CURRENT
DISCHARGE PULSE GENERATOR
1

FIG.11



Gx 、G(x+1) : WIDTH OF PORTION TO BE REMOVED

Vx、 V(x+1) : AVERAGE MACHINING VOLTAGE

V(x) < V(x+1) IN THIS CASE

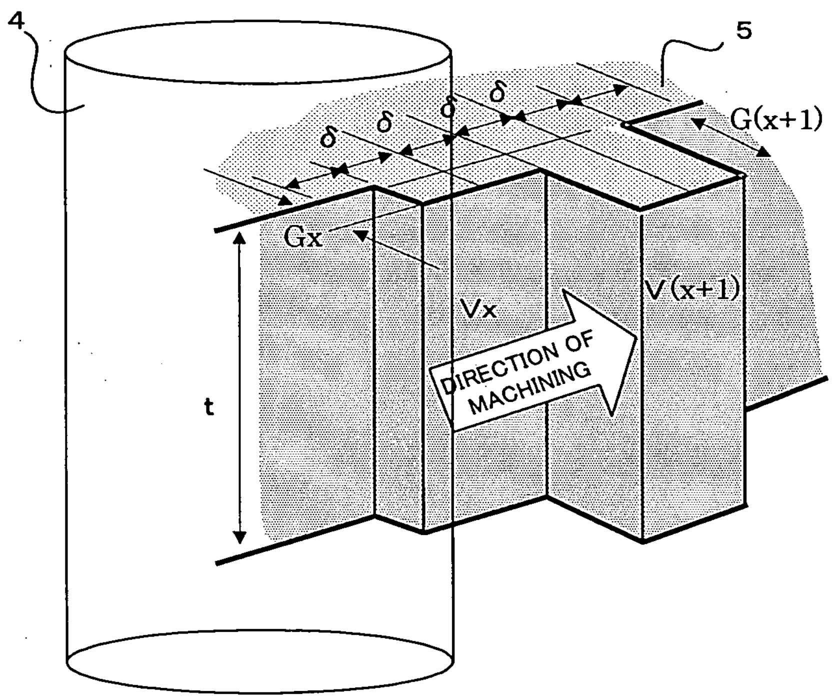
Vs : REFERENCE VOLTAGE

δ x : MOTION AMOUNT PER UNIT TIME = (Vx − Vs) ∗ GAIN

δ (x+1) : MOTION AMOUNT PER UNIT TIME = (V(x+1) − Vs) ∗ GAIN

t : THICKNESS

FIG.12



Gx 、G(x+1) : WIDTH OF PART TO BE REMOVED

Vx、 V(x+1) : AVERAGE MACHINING VOLTAGE

V(x+1) < V(x) IN THIS CASE

δ : MOTION AMOUNT PER UNIT TIME

t : THICKNESS